

WHAT IS CLAIMED IS:

1. A peptide comprising a sequence of less than 50 amino acids characterised in that

- it contains a peptide turn comprising at least one citrulline residue, and
- it contains less than 12 amino acids between two cysteine residues, with said

5 citrulline residue being one of the amino acids between said cysteine residues and

- said peptide is specifically recognised by autoimmune antibodies from patients suffering from rheumatoid arthritis.

10 2. A peptide according to claim 1 characterised in that said peptide is a cyclic peptide.

3. A peptide according to claim 1-2 characterised in that said peptide is biotinylated.

15 4. A peptide according to claim 1-3 characterised in that said peptide is a synthetic peptide.

5. A peptide according to claim 1-4 characterised in that said peptide contains 4 or 6 residues between the cysteine residues.

20 6. A peptide according to claim 1-5 characterised in that said peptide has a sequence containing 14, 15, 16, 17 or 18 amino acids.

25 7. A peptide according to claim 1-6 characterised in that said peptide has one of the following primary amino acid structures:

8 AA – Cysteine – 2 AA – Citrulline – 3 AA – Cysteine – 2 AA, or

5 AA – Cysteine – 2 AA – Citrulline – 3 AA – Cysteine – 2 AA, or

4 AA – Cysteine – 2 AA – Citrulline – 3 AA – Cysteine – 2 AA, or

8 AA – Cysteine – 2 AA – Citrulline – 1 AA – Cysteine – 4 AA, or

30 6 AA – Cysteine – 2 AA – Citrulline – 1 AA – Cysteine – 4 AA, or

4 AA – Cysteine – 2 AA – Citrulline – 1 AA – Cysteine – 4 AA.

8. A peptide according to claim 1-7 characterised in that the amino acids flanking the citrulline residue have a small volume and that they do not interact with the citrulline side chain.

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9. A peptide according to claim 1-8 comprising the amino acid sequence

QDTIHGHPCSXXGHRCGY, or

QDTIHGHPCSSXGHRCGY, or

10 QDTIHGHPCSXXGHQCGY or

QDTIHGHPCSXXGHRCGQ, or

QDTIHGHPCSXXGHQCGQ, or

QDTIHGHPCSXXGCRPGY, or

HGHPCSXXGHRCGY, or

15 HGHPCSXXGCRPGY, or

HGHGCDXXGHRCGQ, or

HGHGCDXXGHRCGQ, or

QDTIVGWGCDSXGCRPGQ, or

VGWGCDSXGCRPGQ.

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10. An antibody raised upon immunisation with a peptide according to any of the claims 1-9, with said antibody being specifically reactive with said peptide and with said antibody being preferably a monoclonal antibody.

25 11. An anti-idiotypic antibody raised upon immunisation with an antibody according to claim 10, with said anti-idiotypic antibody being specifically reactive with the antibody of claim 10, thereby mimicking a peptide according to claim 1-9, and with said antibody being preferably a monoclonal antibody.

30 12 A diagnostic kit for use in detecting auto-immune diseases such as rheumatoid arthritis, said kit comprising at least one peptide according to any of the claims 1-9, or an

antibody according to any of the claims 10 or 11, with said peptide or antibody being possibly bound to a solid support.

13. A diagnostic kit according to claim 12, said kit comprising a range of peptides according to any of claims 1-9 or of antibodies according to any of claims 10 or 11, possibly in combination with antigens that constitute immunogenic determinants for other auto-immune diseases, wherein said peptides are attached to specific locations on a solid substrate.

14. A diagnostic kit according to claim 12 or 13, wherein said solid support is a membrane strip and said peptides are coupled to the membrane in the form of parallel lines.

15. A diagnostic kit according to claim 12 or 13 wherein certain peptides are not attached to a solid support but are provided in the binding solution to be used as competitors and/or to block other antibodies that are present in sera from patients with autoimmune disease other than rheumatoid arthritis, thereby decreasing or eliminating possible cross-reaction and/or a-specific binding.

16. Method for producing a peptide according to any of the claims 1-9, by classical chemical synthesis, wherein citrulline residues are substituted for arginine residues at certain steps during the chemical synthesis.

17. Method for producing a peptide according to claim 1-9, wherein the primary amino acid sequence is produced by classical chemical synthesis, and wherein at least one arginine residue subsequently is transformed towards a citrulline residue by contacting said peptide with a peptidylarginine deiminase.

18. An immunotoxin molecule comprising a cell recognition molecule being a peptide of any of the claims 1-9, or an antibody according to claims 10 or 11, covalently bound to a toxin molecule or active fragment thereof.

19. A peptide according to any of the claims 1-9 or an antibody according to any of the claims 10 or 11 or an immunotoxin molecule according to claim 18 or compositions thereof for use as a medicament.

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20. Use of a peptide according to claims 1-9 or an antibody according to claim 10 or 11 or an immunotoxin molecule according to claim 18 or a composition thereof for the preparation of a medicament or of a diagnosticum for rheumatoid arthritis.

10 21. Use of a peptide according to claim 1-9 or a composition thereof for the preparation of a medicament to treat autoimmune diseases by increasing the size of antigen-immune complexes, thereby improving the clearance of the formed immune complexes.

15 22. Use of a peptide according to claim 1-9 or a composition thereof for the preparation of a medicament for oral or nasal administration to treat autoimmune diseases by inducing a state of systemic hyporesponsiveness or tolerance to said peptide or composition.